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ECONOMICAL CATTLE FEEDING IN THE CORN BELT.

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INTRODUCTION.

The cattle-feeding business has changed greatly during recent years. Formerly steers from 4 to 6 years of age were fed in large numbers upon commercial feeds at yards near granaries or mills, or on large farms where only the roughage was grown, and the cattle were kept on full feed for six months or longer. This method became too expensive, so feeding is now conducted upon farms as a means of marketing farm products by converting them into beef, while the manure produced is utilized as a by-product for maintaining fertility. At the present time in the corn belt cattle are usually fed in small herds of one to four carloads, and are marketed at 18 months to 3 years of age.

There have been a number of factors which have united in causing these changes. For instance there has been a gradual increase in the value of farm products and the cost of farming operations. In the seven leading cattle-feeding States the prices of various feeds on December 1 of the years 1899 to 1901 and 1909 to 1911 have been taken, and during this 10-year period it was found that the price of corn had advanced 29 per cent and hay 45 per cent, while such supplemental concentrates as linseed-oil meal and cottonseed meal had increased in about the same proportion. The price of labor has advanced 31 per cent, and feeder steers have advanced 36 per cent since 1904. Lastly, the value of land has increased 103 per cent

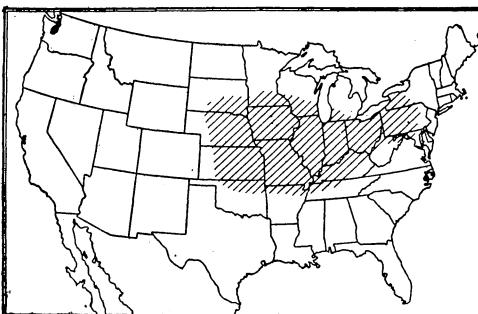


FIG. 1.—The shaded portion indicates the region to which this bulletin is applicable.

NOTE.—This bulletin is intended to promote cattle feeding on moderate-sized farms; it is suitable for distribution throughout the corn belt.

during the decade 1900 to 1910. This increase in land value makes a much larger capitalization upon which interest must be charged.

All of these items taken together make a heavy increase in the cost of feeding, and although the prices of finished cattle have increased greatly, they have not kept pace with the increased expenses. Thus, comparing the three-year period from 1899 to 1901 with that of 1909 to 1911, native steers on the Chicago market have advanced about 24 per cent. Again, as the price of feeders has advanced faster than that of fat cattle, the margin of profit is smaller than formerly. These conditions have caused many feeders either to curtail their feeding operations greatly or else stop feeding entirely.

Another important factor is the rapid increase in tenant farming in many of the cattle-feeding sections, and tenant farmers are seldom financially able to practice cattle feeding. Short-term leases discourage cattle feeding by a tenant and encourage soil robbing. The short-term tenant usually will not feed even if financially able to do so. These changes are especially noticeable in the eastern part of the corn belt. In the western portion there has been a tendency to increase the number of cattle fed.

DECLINE IN THE SUPPLY OF FEEDER CATTLE.

There have been two main sources of supply for feeder cattle—those grown in the corn belt, commonly called natives, and those coming from the western ranges. The native cattle were usually grown on the rougher farms of the corn belt, or on small farms, where dual-purpose cows were kept. They were usually sold to local feeders as yearlings or 2-year-olds. Some feeders desiring animals of extra good quality raised their own feeders. The rapid advance in the prices of land and farm products made it unprofitable to compete with the western ranges in the production of stocker and feeder cattle. Therefore, in nearly all portions of the corn belt except on the very rough lands, the breeding herds were greatly reduced or were changed for dairy cows, and as a result few feeders are now produced.

The exploitation of dry-land farming has resulted in the best lands of the open range being taken up for grain-growing purposes, and the number of cattle over the entire western range country decreased rapidly, due to excessive liquidation, which culminated with the drought of 1911-12. Such conditions could but result in a shortage of feeder cattle. Securing feeders is now a serious problem which must be solved by many of the farmers raising their own cattle. On the high-priced lands that are capable of intensive cultivation it is questionable if this can be done economically, but there are numerous farms within this region where a considerable proportion of the land is too rough for economical tillage, and on which, with prevailing prices, stock cattle can be raised advantageously. There are splendid

opportunities for raising cattle in the southern States, and on some of the cut-over lands to the north of the corn belt. While the western country may eventually be restocked, it will be some years before it will carry as many cattle as formerly, and the demand for feeders will probably increase for several years to come.

COST OF PRODUCING CATTLE.

It is difficult to estimate accurately the cost of raising cattle, as it varies greatly on different farms. Considerable data at hand show that for a calf 6 months old, weighing 450 pounds, the cost of raising varies from \$17 to \$23 in the West and from \$20 to \$28 in the East. The freight rates and other shipping charges from the West will practically offset this difference, so that the calves will cost about the

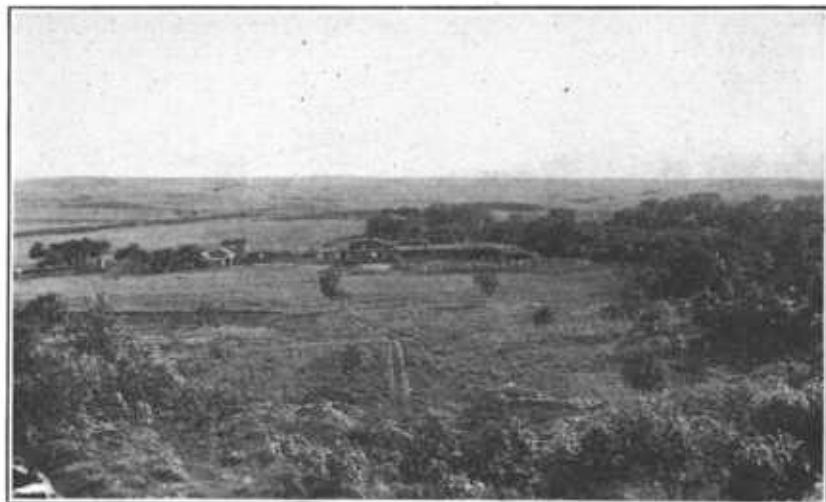


FIG. 2.—Cattle ranch in western South Dakota that was abandoned because settlers homesteaded all the range. Observe not only the abandoned cattle ranch but the settlers' homesteads in the distance.

same in eastern feed-lots whether raised locally or shipped from the corn-belt States. At 6 cents a pound these calves would ordinarily bring about \$27 and would usually insure the producer a fair profit.

The following figures show the cost of raising calves on a ranch in the limestone belt of Kansas, where land is worth \$50 an acre. The cows were valued at \$70 each, this being the approximate price they would bring as beef.

Interest on investment of 1.17 cows at 6 per cent (estimating 85 per cent calf crop).....	\$4.91
Cost of feed for 1.17 cows for one year:	
Winter feed for 6 months at \$10 per cow.....	11.70
Summer pasture at \$4 per cow per season.....	4.68
Bull service.....	1.64
Total.....	22.93

Bull service is reckoned as follows: The bulls cost \$225; they will sell at the end of three years for about \$100, a depreciation of \$125, or \$41.67 a year. Estimating that a bull will serve 50 cows and get an 85 per cent calf crop, he will produce 42 calves yearly.

Interest on investment of bull per calf.....	\$0.32
Depreciation of bull per calf.....	.99
Cost per calf of feed for bull for one year on the same basis as for cow.....	.33
Total.....	1.64

While the calf crop is estimated at 85 per cent, that being the number that would be raised to the age of 6 months, as a matter of fact this figure is seldom attained. The cost of winter feed consumed by cows in Kansas does not always reach the figure of \$10 per head, as it



FIG. 3.—An inexpensive but well arranged feed yard for central Kansas.

did on this ranch. The cost of wintering cattle varies so greatly, depending upon the methods used and upon local conditions, that this item will have to be accounted for by each individual farmer. Taxes, insurance (or loss of cows and bulls), depreciation of cows, and interest, taxes, and depreciation on the winter feeding equipment have not been considered. These have been allowed to offset the manure. The cost of raising an animal to $2\frac{1}{2}$ years old, figuring interest, taxes, insurance, feed, and overhead charges, was approximately \$55. This figure is about the maximum cost of such a steer in the corn belt, and many of the western ranches raise similar steers for less money.

Figures have been compiled to show the cost of growing calves when they are weaned and the cows used for production of milk. While the figures are not complete they show that the cost will be a

little less than where the calf is allowed to run with its mother. Under such conditions all expenses of the cow and the bull are charged to the milk. There are, however, other expenses which must be included. Skimmed milk and a considerable quantity of expensive concentrates to supplement the milk are required; and as such a calf requires considerable attention the labor costs are greatly increased. Then, too, the chances of loss are much greater than when the calf runs with its mother. While the figures show a fair chance for profit in this method, nevertheless the prevailing prices for calves when only a few weeks old are such that few farmers will care to take the extra risk and work, but will prefer to sell them for veal.

ADDITIONAL FACTORS INFLUENCING THE COST OF STOCKER AND FEEDER CATTLE.

There are two additional factors that greatly influence the price of stocker and feeder cattle; first, the increased demand for veal, and second, the increased competition in securing feeders.

Demand for veal.—The demand for veal has increased rapidly, and not only are the surplus dairy calves slaughtered, but thousands of beef calves as well. Census figures show that in 1899, 883,857 calves, having an average value of \$8.20, were slaughtered in wholesale slaughtering houses, while in 1909, 2,504,728 calves, with an average value of \$10, were slaughtered, an increase of 183 per cent in 10 years, whereas the corresponding increase in cattle for the same period was but 47 per cent. This does not include the number of calves that are killed on farms and in small slaughter houses.

This growing demand for veal has raised the price of that commodity until a calf will sell for \$8 to \$12 when only 2 or 3 months old. This means that unless the farmer has unlimited cheap feeds, it is usually more profitable to market the dairy or dual-purpose calves than to attempt to raise them, even though some of them might make good steers. While many deplore this heavy slaughter of calves, and legislation against it has been urged, the consumers' demands must be met.

Competition.—While the number of cattle has decreased, the demand for meat has naturally grown until not only have the exports nearly ceased, but the packers, that they may provide cheaper meat, are now buying many cattle that were formerly fed. The farmers who formerly bought nearly finished cattle as feeders have been compelled to pay higher prices for such cattle or to take thinner animals, thus in turn increasing the demand for this class.

BUYING AND SELLING CATTLE.

Much importance should be attached to the buying and selling of cattle, for the success of a feeder will depend as much on his ability to purchase and to market his cattle advantageously as it will on his

skill in finishing them. Successful feeders should study the market papers in order to be in position to buy cattle to advantage. Furthermore, they should study the general trend of the market for fat cattle that they may sell their cattle when the market is strong, for at different times of the year certain grades of cattle sell better than others.

Before purchasing his feeders the farmer should estimate the quantity of feeds on hand and their market price, the number and class and size of cattle desired, and the time required to consume the feed. Then he can estimate from market reports the approximate cost of his feeders, and with these various items at hand can figure what they must sell for if he is to break even. He is then in position to select steers which will suit the given conditions. If the outlook is not good, it is usually advisable not to purchase at that time. It is an old adage among stockmen that "cattle bought right are more than half sold." A man may be a skillful feeder and lose money year after year because of poor judgment in buying. The beginner should hire some experienced cattleman to purchase animals that will best suit his needs, or deal with a reliable commission firm that is acquainted with his conditions. By following the various market reports the feeder can tell approximately when his cattle can be marketed to greatest advantage. The steers should be fed so as to be finished at that time. When the steers are ready for market, it is usually not advisable to hold for better prices unless they continue to gain in weight and condition. The extra feed consumed by finished cattle will soon more than offset any ordinary increase in price that may be obtained. When they are almost finished the owner should watch the market reports and communicate with his commission man to determine the date of shipment.

There is at times a strong demand for cattle that are not quite finished but which would class as "good killers," and the price of these cattle frequently approaches very near that for prime steers. Such conditions justify a feeder in sending his steers to market at that stage, as it is sometimes more profitable than finishing them, for the gains made during the latter part of the feeding period are very expensive. It is always wise to ship the cattle when the markets insure a reasonable profit. Too many feeders in looking for a better price overstay the market and get caught on the decline.

It is the uniform opinion of commission men that the farmers' losses would be less if they knew more about market conditions and also knew more about the actual cost of the feeding operations on their farms. This simply emphasizes the importance of keeping farm records of the cost of feeding and studying the market papers and reports.

COST OF FEEDING CATTLE.

To determine as accurately as possible the cost of feeding farm animals cost-accounting records were kept for two years on 24 Iowa farms. The men selected were leading farmers in their communities, known to be careful and experienced feeders. During the feeding year beginning with the fall of 1909 the average profit on 961 cattle fed in 22 bunches was \$2.05 per head, in addition to the profits on the hogs following them. The prices received were very satisfactory. The 1,504 hogs following these steers were given extra grain. Market prices in the spring of 1910 were such that a profit of \$6.67 per hog was secured, thus giving a profit of \$12.49 per steer when the pork was credited to the steers.

The following feeding year, 1910-11, proved unsatisfactory, due to prices which caused a loss of 78 cents per head on 1,138 cattle that were fed on 28 farms. The 1,646 hogs following these steers returned an average profit of \$3.33, or, when the profit on the hogs was credited to the steers, the net profit was \$4.04 per steer.

Few feeders in the past have kept records of exact expenses of the feeding operation, although many of them knew approximately what it cost. It is essential that such records be kept, for the fast increasing prices of feeders seem to indicate that the margin on cattle may be closer than formerly. Until systems of cost accounting which took into account all the overhead charges as well as the main cost were used the expense of feeding was underestimated. The following table shows the proportionate cost of different items, based on the cost-accounting records kept on the 24 Iowa farms. These figures will vary somewhat from year to year as the relative prices of cattle and feeds change. The greatest variation will occur in the original cost of the cattle and in the cost of the feeds.

Percentage of the various expenses incurred in cattle feeding on 24 Iowa farms.

Year.	Pur-chase price. ¹	Feed.	Interest at 6 per cent.	Labor.	Shipping and selling. ²	Total.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
1909-10.....	55.8	36.9	1.3	1.6	4.4	100
1910-11.....	59.9	31.8	1.8	1.8	4.7	100

¹ Delivered at farm (including freight and incidental charges).

² Exclusive of shrinkage.

It will be seen that the purchase price of the cattle was rather more than one-half of the total cost for the two years, while the cost of the feed averaged about one-third of the total expense. In this table no account is made of the occasional loss of a steer, which ordinarily averages one-half of 1 per cent of the total number per year. Neither have interest, taxes, and depreciation charges on the feeding plant

been considered, as it is impossible to make any definite charges for these items. A careful study indicates that these and other incidental charges would about offset the value of the manure, which is also difficult to estimate.

Interest.—Many feeding statements are made which do not include interest. This item must be considered, for the farmer financing such an operation must either borrow or set aside a certain amount of money that might be permanently invested elsewhere. In the foregoing table interest has been charged at 6 per cent on the cost of the cattle laid down at the farm, that being the amount that the farmer will ordinarily borrow or withhold.

Labor.—The cost of labor is seldom included in cattle-feeding transactions, as it is customary to allow this item to offset the value of the manure. For reasons previously stated this should be made a separate charge. In the above records, figuring man labor at 16 cents and horse labor at 8 cents an hour, the labor cost on 49 bunches of cattle totaling 2,100 head for an average feeding period of 146 days was a little over $9\frac{1}{2}$ mills per head per day. The cost varied from 4 mills to as high as 2 or 3 cents, depending on the manner in which the cattle were fed. A large feeder in Kansas who formerly fed 1,000 steers each winter for commission men, in making up his charges, figured on 1 cent a day per steer for labor. On 500 head this gave him a small profit, which increased with the number fed. A large feeding plant that operated for 11 years in Nebraska and during that time fed about 50,000 steers, figured its labor cost at 1.2 cents per head per day. While this firm had expensive labor and equipment, it nevertheless had every convenience for the economic handling of the feeds.

Selling costs.—The selling cost, including freight, yardage, commission, and other incidentals, will vary with the distance shipped. The total cost on 676 cattle shipped from central Iowa to Chicago amounted to \$3.98 per head, or 31 cents per hundredweight. This does not include shrinkage in transit, which would have to be added to these costs. As the average shrinkage in transit of all classes of cattle is about 4 per cent of their live weight, the value of this loss in weight may be added to the above costs and the amount calculated on the hundredweight basis. These figures give a fair working estimate, as ordinarily the freight rate will not run much higher, because persons living farther east will either be a shorter distance from Chicago or will choose some market still farther east. Those living farther west will, to a great extent, patronize the "river" stockyards. A prominent Kansas feeder estimates, figuring all charges, that it costs 50 cents per hundredweight to ship from the central part of that State to Chicago, this charge varying somewhat with the weight of the cattle.

FEEDING MARGIN.

The difference between the purchase price and the selling price of an animal is called the margin of profit. This is usually estimated on the basis of 100 pounds live weight. Thus a margin of \$1.50 means that the feeder received \$1.50 per hundredweight more for the animals than he paid for them. The amount of margin is a very important factor in the profit from feeding steers. The margin required to break even in feeding operations depends upon a number of factors, the principal ones being (1) the purchase price, (2) the weight of the cattle when purchased, (3) the value of the feeds used, (4) the gain in weight made by the animals, and (5) the length of the feeding period. The higher the purchase price, the heavier the steer when purchased, the cheaper the feeds, the greater the daily gains, and the shorter the feeding period, the smaller the margin may be between the purchase price and the selling price of the cattle, without loss to the feeder. With a steer of poor quality and with high-priced feeds, the margin must of necessity be great, but with the best quality of steers and with cheap feeds the necessary margin may be very small.

EQUIPMENT.

The necessary equipment depends on the locality and the time of year the cattle are fed. When cattle are fed on pasture the feed bunks for the concentrates are usually all that is needed. If dry-lot feeding is practiced, during those seasons other than winter a lot of sufficient size containing the necessary feed bunks, hay racks, and water troughs is sufficient.

If winter feeding is practiced, some form of shelter is necessary, the amount varying with the region. In Kansas and Nebraska, where there are comparatively few stormy days in early winter, yards having a southern exposure and a slope that will drain readily will usually be sufficient. That portion of the yards where the cattle lie down should be protected by windbreaks. In localities where stormy weather is more prevalent barns or sheds are usually necessary. If barns are used they should be well ventilated, and in such manner that the cattle will not be in a direct draft. Sheds that are open on one side, preferably to the south, usually prove more satisfactory, not only because they are cheaper, but because the cattle do better except in very severe weather.

The modern feeder should have that part of the feed lot paved where the cattle lie down. If these areas are well bedded the cattle can always keep comfortable and will consequently make better gains. It is not infrequent that a period of warm weather occurs during the winter and the lots become very muddy, making it necessary to ship the cattle before they are ready. This sometimes causes

a congestion of the market, with a consequent drop in prices. The feeder who is forced to ship because of muddy lots may lose more in one year than the cost of the pavement.

Not only will the cattle make better gains, but animals that are covered with manure and mud are usually discriminated against to the extent of 10 to 15 and sometimes 25 cents per hundredweight. It has also been definitely shown that hogs following steers on paved lots make nearly 1 pound more of pork per bushel of corn fed the steers than do those in ordinary mud lots.¹ With pork at 6 cents a pound this item will amount to about \$1.50 per steer.



FIG. 4.—A feed yard in Nebraska where cattle can not make proper gains because of muddy condition of the yard. The feed lot is more than a quarter of a mile long. Feed is at one end and water at the other. In wet weather cattle consumed 30 minutes of time tramping through the mud from feed to water or vice versa.

CARE OF THE MANURE.

As cattle will be fed more as a means of maintaining fertility than as a direct source of profit, the manure must be properly cared for. Paved floors should be provided for the buildings or for that part of the yard which the cattle frequent most, and sufficient bedding should be used to absorb the urine.² Two-thirds of the nitrogen and from three-fifths to three-fourths of the potash are passed off in the urine.

On a three-months' feed from 2 to $2\frac{1}{2}$ tons of manure, including the bedding, will be produced by a 1,000-pound steer. That the greatest value may be obtained from this manure it should either be hauled to the field as soon as produced or be allowed to accumulate in sheds

¹ Beef Production, H. W. Mumford, Urbana, Ill., 1907, pp. 145-146.

² See Farmers' Bulletin 481, "Concrete Construction on the Live Stock Farm."

where the cattle will keep it tramped, sufficient bedding being used to absorb the liquid portion and to keep the animals clean and dry. As soon as possible after the cattle are sold the manure should be hauled to the field.

Even with the best of care there will be some loss. When feeders bought concentrates, as they formerly did, this loss was more than offset by the fertilizing value of the purchased grain, and the farms were rapidly built up to a high state of fertility. As the purchasing of large quantities of extra grain is now impracticable, this loss will have to be made up in some other way. The nitrogen can be supplied by growing legumes or by using linseed-oil cake or cottonseed



FIG. 5.—A conveniently arranged feeding system that would be ideal if that part of the yard shown were paved. Note some of the steers in mud almost to the hocks. These cattle had to be held after they were finished to get them free of some of the mud and manure with which they were covered.

cake as a supplementary feed, and it will only be necessary to provide for the equivalent amount of phosphorus that is taken away, which is comparatively inexpensive, except on soils deficient in potash, in which case the latter element also will have to be supplied.

The value of the manure depends on its care, the feeds used, the cost of getting it on the land, and the elements that the soil needs. If the manure is dropped in open yards and exposed to the weather much plant food is lost. If, on the other hand, it is voided on paved floors in sheds the losses will not be so great. On badly run-down soils manure can be valued at the market price of the elements that it contains, and in some cases it is worth even more than the commercial value of the fertilizing elements because of its effect on the mechanical

condition of the soil. On soils naturally rich in humus and plant food and where clover is grown, the value of the manure will be much less. The ordinary farm price of \$1 to \$1.50 per ton seems about right if the haul is not too great.

SYSTEMS OF FARMING TO MAINTAIN SOIL FERTILITY.

While it is possible to maintain the fertility of the soil without any live stock on the farm, it is doubtful whether such systems are advisable under present conditions for the corn-belt farms. This is partly because they require careful farming on an intensive scale, and also for the reason that without live stock the country would not be in a position to utilize the corn crop. These systems are based on the utilization of green manure crops and commercial fertilizers. Types of successful farming in this region should, for some time to come, include sufficient live stock to help maintain fertility, to utilize the waste products on the farm, and to consume part of the immense quantities of corn produced.

The system to be followed will depend somewhat upon the climate, the conditions of the farm, and the preferences of the farmer. In their efforts to adjust themselves to present conditions, progressive feeders have worked out a number of systems which will probably prove successful for some time to come.

CATTLE FEEDING ON HIGH-PRICED LAND.

As most of the tillable land is capable of producing large yields of corn, the usual rotation will be corn one or two years, small grain, and clover. On such a farm cattle should be fed, and if all the land is in rotation they can be fed in dry lots. Calves or young steers make a larger gain per pound of feed than mature steers, but hogs following them do not fatten as rapidly. Then, too, calves or yearlings must be higher in quality and better bred than mature steers to sell well. Heavy steers may be rougher and have less quality than younger cattle, but still sell well if they are fat. The feeding should be conducted during those months when other work is at a minimum, that the labor may be better distributed. This is especially desirable on farms where the labor is employed the year round in order to have competent help during the busy season.

If a portion of the land is too rough for cultivation, or if the farm is of such a size that there is too much land for the help employed and not enough to demand another hand, it is often advisable to keep this extra land in permanent pasture. On many large farms it is better, because of the scarcity of labor, to farm less intensively and keep a considerable area in pasture. Under such circumstances feeding on pasture should prove remunerative.

Many experienced feeders have in the past preferred summer feeding, as they considered it more profitable. Experimental evidence secured by the Missouri Experiment Station¹ shows that a bushel of corn will produce 6.9 pounds of gain when the cattle are fed on pasture in summer, as against 5.6 pounds in winter feeding. While summer feeding on pasture has in the past proved more profitable, it is a question in the minds of many if it would not be more remunerative to put these pastures into rotation where corn can be grown, when good help can be secured.

The advantages of winter feeding consist in the opportunities to make better use of the by-products, such as corn fodder, damaged hay, etc., and the better distribution of labor. In the western part of the corn belt the majority of the cattle are fed during the late fall and early winter months, so that they may be out of the way before bad weather sets in, thus avoiding expensive shelter. A little farther east, where the disagreeable weather begins earlier, it is customary to rough the cattle on pasture and stalk fields until December or January, when they are put into the yards and fattened. In the eastern part of the corn belt cattle are frequently fattened in sheds or barns.

The number of steers to be fattened depends on the quantity of roughage available. If there is a surplus of corn it should be sold or fed to hogs. On the other hand, if there is a slight deficiency, it may prove more economical to buy a little corn or other concentrate than to dispose of the rough feed.

LENGTH OF THE FATTENING PERIOD.

The time required to fatten cattle depends largely on the animals themselves. Thin cattle require more time than those in good condition, while cattle of inferior quality can not be profitably carried to as high a degree of finish as animals of a better grade. The length of the fattening period will also depend upon the prices of the feeds used. When corn is high the various roughages or other cheap feeds should largely be used, and the grain ration limited, especially during the first half of the feeding period. This will necessitate the steers being fed for a longer period before the real fattening process begins. When corn is cheap, steers can be kept on full feed longer and more corn can be utilized in finishing.

Formerly from six to eight months were required for making prime beef. Because of the great expense in fattening such cattle and because the demand is becoming somewhat limited, few feeders follow this practice at the present time. The average feeder of to-day can not afford to keep cattle on full feed to exceed five months.

¹ See Bulletin 75, Missouri Agricultural Experiment Station, p. 37.

QUALITY OF CATTLE TO USE.

Generally speaking, the feeder should handle only the beef breeds. Any of these are good, and crosses such as the Hereford-Shorthorn are often preferred. Usually only animals of fairly good quality should be used, as they sell for a higher price and dress a higher percentage of beef.

If there is an abundance of rough feed, it is better to buy rather thin steers; but if the quantity of roughage is limited, it will be better to get fleshy steers that can be finished in a short time and get them on full feed as soon as possible.

The inexperienced feeder should always handle cattle of good quality that are as uniform in size and condition as possible. On the other hand, the experienced feeder who is in touch with market conditions should handle those animals which he thinks will make him the most money, regardless of quality.

WINTER FATTENING.

There are a number of combinations of feeds that can be used for fattening cattle during the winter. These rations should be so compounded as to utilize a large quantity of available corn fodder which is chiefly handled as corn stover or silage.

SILAGE FOR WINTER FEEDING.

Silage is being more extensively used in fattening cattle each year. Its addition to any ration for fattening cattle results in larger and cheaper daily gains. The quantity of corn consumed by silage-fed cattle is practically the same as that consumed by cattle receiving dry roughage and corn, when the quantity of corn in the silage is taken into consideration. Silage should be considered only as a roughage and should not be expected to replace more corn than is contained in it, but slightly larger daily gains may be expected from its use.

While silage can usually be produced cheaply and may be considered a cheap feed, it is not necessarily so. Unless the feeder has enough stock to consume at least 100 tons of silage the silo is anything but economical, considering the amount of capital required for a silo and machinery in proportion to the quantity of feed produced.¹ Then, too, the economy of silage will depend upon its relative cost as compared with other forms of roughage. In years of cheap hay, when alfalfa or clover is worth less than \$8 per ton, it is doubtful if silage costing \$3 a ton will prove economical. However, when hay sells at more than the above price, silage will prove cheaper unless the cost of producing it also increases. Those desiring a fuller dis-

¹ See Bulletin 73, Bureau of Statistics, U. S. Department of Agriculture, p. 73.

cussion concerning the value and use of silage for winter feeding should read Farmers' Bulletin 578, of the United States Department of Agriculture.

DRY FEEDING.

Those persons to whom silage feeding is impracticable will find that cattle may still be economically fattened when shocked corn and a good quality of straw are utilized as part of the rough feed. While there is more waste in feeding shocked corn, nevertheless, a ton and a half of stover has approximately the same feeding value as a ton of timothy hay. The waste stalks that are too coarse to be readily eaten will serve as bedding and can be worked into manure. Cattle may be turned out into the cornfields to consume the stover in years when there is plenty of cheap roughage. Although there is considerable waste of forage, the stalks, providing they are plowed under and not burned, will furnish considerable humus, and the expense of hauling to the barn in the form of fodder and returning to the field in the form of manure will be avoided. During years of high-priced roughage, however, this practice will not be economical.

FEEDING ON PASTURE.

In regions of high-priced land there is a tendency to plow up the pastures that are suitable for cultivation and grow more corn. However, to make better use of the rough portion of their farms and to make a better adjustment of their farming operations, some farmers will prefer summer feeding on pasture. This can be done on a permanent blue-grass pasture or on a field of timothy and clover. The permanent pasture sod should be at least 5 years old. If the pasture is temporary it will usually be necessary to feed some supplementary concentrate, such as cottonseed meal, in addition to corn.

In fattening on pasture the aim should be to utilize as much grass as possible. Therefore, cattle carried through the winter with the expectation of finishing on pasture should seldom be fed heavily during the winter. It is considered better economy to carry them on cheap feeds, keeping them thrifty without endeavoring to put on any increase in flesh. Such cattle will make rapid gains when turned on pasture and can be finished late in the season with a minimum amount of corn.

METHODS ADAPTED TO MODERATE-PRICED LAND.

On farms where the land is moderately high priced and a considerable area must be kept in pasture, or on farms where there is considerable rough feed that must be utilized, there are two principal methods that can be used. The first is to buy calves or yearlings and either raise them to maturity or, if of extra good quality, feed as baby beef. The second is to maintain breeding herds and raise baby beef.

GROWING AND FINISHING CATTLE.

An excellent plan for utilizing the rough feeds and also avoiding competition in buying feeders is to buy calves and yearlings and raise them. These cattle can be roughed through the first winter at a moderate cost and run on pasture during the summer. They can be fed out the following winter or carried through on cheap feeds until the next summer and fattened on pasture.

A good example of the utilization of rough feeds is shown in the methods used on a 900-acre farm in northwestern Missouri. The owner is primarily a corn grower and hog raiser, usually raising from 150 to 200 hogs annually, which are sold when they weigh from 200 to 300 pounds each. This farmer considers it necessary to handle cattle to use the rough feeds and a considerable area of pasture land to the best advantage. He usually buys a carload of good Texas calves each fall. The calves are run on pasture for a few days and then turned into the corn fields, where they graze on stalks until the bad weather begins. In winter they are fed on straw, damaged hay, and soy-bean meal, and are given the run of a timbered pasture for exercise and shelter. He raises the soy beans and feeds each calf a ration of 2 pounds of soy-bean meal a day. It would probably have been more profitable, however, to cut the soy beans for hay than to permit the beans to mature enough for thrashing and grinding, as most of the leaves are lost by the latter method, and soy-bean leaves have as great a feeding value as wheat bran.

After May 1 the grain is discontinued and the cattle are turned on blue-grass pasture, where they remain until fall. In the fall he has the option of selling them as feeders, fattening them at once, or carrying them over another year. The plan adopted is determined by the available supply of roughage and corn, the price of these commodities, the quality and condition of the animals themselves, and the market outlook.

BABY BEEF.

The raising of baby beef can be most safely practiced on those farms where there is a large amount of pasture and an abundance of roughage. It is not as well adapted to intensive farming as the feeding of heavier cattle, and should not be attempted on a large scale except by experienced feeders.

The number of animals that can be handled will usually depend on the area of available grazing land, and the size of the breeding herd should be based on this factor. Ordinarily some other form of live stock should be kept in conjunction with the cattle. If there is a considerable area of tilled land hogs can be raised or older cattle can be handled in addition. When the land is chiefly adapted for grazing, a few sheep can be advantageously run to utilize those feeds that the

cattle do not relish, care being taken not to overstock the pastures or to run the sheep with the fattening animals.

Only well-bred cattle can be profitably fattened as baby beef; it is therefore essential that the cows be high-grade animals, and that pure-bred sires be used. This is because young animals have a tendency to grow, and unless they have been carefully bred for beef purposes it is impossible to get them to fatten properly. Although heavy cattle can be marketed before they are finished, baby beef must be prime in order to find a ready sale.

Calves intended for baby beef should be kept growing continuously and should never be allowed to lose their calf fat. They should be accustomed to eat grain before they are weaned, and during the winter should be fed plenty of grain, clover hay, and silage, if it is available. The latter is an excellent appetizer, and calves do exceedingly well when this succulence makes up a part of their ration.

There is danger of losing good calves from blackleg, as this disease seems to affect calves which are in good flesh. This risk may be eliminated by vaccinating the calves at an early age. Vaccinating material may be secured free of charge from the Pathological Division of the United States Department of Agriculture by anyone who will agree to submit a report of the results secured by vaccinating. As the vaccine is easily administered and remarkable results have been obtained from its use, no farmer should fail to vaccinate his calves if blackleg is prevalent in his community or if there have been deaths from blackleg on his premises within recent years.

HOGS FOLLOWING CATTLE.

All of the above systems of feeding presuppose that hogs follow the fattening cattle. It is more profitable to follow cattle with hogs, except possibly when young cattle are fed on ground corn in large numbers and the cost of grinding is very low. In fact, the best authorities believe that with the present narrow margin for fat cattle it is inadvisable to feed without hogs. The cost accounting records kept in Iowa, previously referred to on page 7, tend to bear out this belief. When the steers sell for enough to break even, or if they show a slight loss, the hogs that follow will ordinarily make sufficient gains from the wasted corn to make the feeding operations profitable. Not only is steer feeding more profitable when hogs are used, but the hogs usually prove more remunerative than if fed alone, because of the large amount of feed they secure from the droppings.

The best type of hog to run behind cattle is a thrifty shoat weighing about 100 pounds, somewhat thin, and consequently in good condition to utilize the corn. Heavy, nearly finished hogs are not profitable behind steers and should be placed by themselves. Young pigs

are objectionable, because of the danger of being injured by the steers and because the feed obtained from the droppings is not adapted for them, as they require more protein.

The number of hogs to follow a steer will depend on the method of feeding. Some farmers feed the steers more corn than they will eat and run extra hogs, figuring on the hogs getting the waste. While this may be a good policy when corn is cheap, it is doubtful if it should be practiced with high-priced grain. It is usually best to figure on about one shoat per steer when shelled corn is fed and two when ear corn is fed. In case the corn is ground or soaked, or silage is used, the number of hogs would be less. The aim should be to run enough hogs to clean up all the waste corn.

The daily gains that the hogs make will depend materially on the condition of the feed yard. They will also be affected by the quan-



FIG. 6.—Typical feeding plant in Central Illinois. The hogs are fed extra corn in a separate yard.

ty of grain given and the form in which it is fed. In general, it is probable that when a steer is fed one-third of a bushel of shelled corn a day, approximately three-fourths of a pound of pork will be obtained. When ear corn is fed the gains will be greater. On the other hand, if corn meal or corn-and-eob meal is fed the amount of pork produced is very small, as the grain is much better utilized by cattle. In fact, experience and experimental evidence show that when corn is most efficient for steers it is least so for hogs, and vice versa.

The gain will be greater if the steers are fed some leguminous hay or some concentrate high in protein, such as oil cake. Nearly all farmers give the hogs corn in addition to that secured from the droppings. Corn for the hogs should always be fed away from the cattle and should usually be given first, so that the steers may not

be annoyed. The hogs should also be provided with separate watering places and separate places to lie down.

SHRINKAGE IN SHIPPING TO MARKET.¹

The shrinkage in weight varies according to distance shipped, the preparation of the cattle, size of the cattle, and numerous other factors, and is therefore hard to estimate accurately. The shrinkage in shipping cattle from Iowa to Chicago, or from points in Kansas to Kansas City, would be from $3\frac{1}{2}$ to 5 per cent of their live weight, with an average of about 4 per cent.

When cattle are sold at home they are usually held for 12 hours without feed or water before weighing or are weighed direct from the feed lot and a 4 per cent shrinkage deducted. The shrinkage in shipping is usually very little in excess of this amount. The feeder should therefore count on about 4 per cent shrinkage on the finished animal when considering the cost of feeding.

¹ For a full discussion of this subject see Bulletin 25 of the U. S. Department of Agriculture, entitled "The Shrinkage in Weight of Beef Cattle in Transit."

